

Table 5a
Maximum Permissible Exposure (MPE) for Small-Source Ocular Exposure to a Laser Beam [†]

Wavelength (μm)	Exposure Duration, t (s)	MPE		Notes
		($\text{J} \cdot \text{cm}^{-2}$)	($\text{W} \cdot \text{cm}^{-2}$)	
Ultraviolet				
0.180 to 0.302	10^9 to 3×10^4	3×10^{-3}		
0.303	10^9 to 3×10^4	4×10^{-3}		
0.304	10^9 to 3×10^4	6×10^{-3}		
0.305	10^9 to 3×10^4	10×10^{-3}		
0.306	10^9 to 3×10^4	16×10^{-3}		
0.307	10^9 to 3×10^4	25×10^{-3}		
0.308	10^9 to 3×10^4	40×10^{-3}		
0.309	10^9 to 3×10^4	63×10^{-3}		
0.310	10^9 to 3×10^4	0.1		
0.311	10^9 to 3×10^4	0.16		
0.312	10^9 to 3×10^4	0.25		
0.313	10^9 to 3×10^4	0.40		
0.314	10^9 to 3×10^4	0.63		
0.315 to 0.400	10^9 to 10	$0.56 t^{0.25}$		
0.315 to 0.400	10 to 3×10^4	1.0		
Visible and Near Infrared				
0.400 to 0.700	10^{-13} to 10^{-11}	1.5×10^{-8}		
0.400 to 0.700	10^{-11} to 10^{-9}	$2.7 t^{0.25}$		
0.400 to 0.700	10^9 to 18×10^{-6}	5.0×10^{-7}		
0.400 to 0.700	18×10^{-6} to 10	$1.8 t^{0.75} \times 10^{-3}$		
0.400 to 0.450	10 to 100	1×10^{-2}		
0.450 to 0.500	10 to T_1			
0.450 to 0.500	T_1 to 100	$C_B \times 10^{-2}$	1×10^{-3}	
0.400 to 0.500	100 to 3×10^4		$C_B \times 10^{-4}$	
0.500 to 0.700	10 to 3×10^4		1×10^{-3}	
0.700 to 1.050	10^{-13} to 10^{-11}	$1.5 C_A \times 10^{-8}$		
0.700 to 1.050	10^{-11} to 10^{-9}	$2.7 C_A t^{0.25}$		
0.700 to 1.050	10^9 to 18×10^{-6}	$5.0 C_A \times 10^{-7}$		
0.700 to 1.050	18×10^{-6} to 10	$1.8 C_A t^{0.75} \times 10^{-3}$		
0.700 to 1.050	10 to 3×10^4	$C_A \times 10^{-3}$		
1.050 to 1.400	10^{-13} to 10^{-11}	$1.5 C_C \times 10^{-7}$		
1.050 to 1.400	10^{-11} to 10^{-9}	$27.0 C_C t^{0.25}$		
1.050 to 1.400	10^9 to 50×10^{-6}	$5.0 C_C \times 10^{-6}$		
1.050 to 1.400	50×10^{-6} to 10	$9.0 C_C t^{0.75} \times 10^{-3}$		
1.050 to 1.400	10 to 3×10^4	$5.0 C_C \times 10^{-3}$		
Far Infrared				
1.400 to 1.500	10^9 to 10^{-3}	0.1		
1.400 to 1.500	10^3 to 10	$0.56 t^{0.25}$		
1.400 to 1.500	10 to 3×10^4		0.1	
1.500 to 1.800	10^9 to 10	1.0		
1.500 to 1.800	10 to 3×10^4		0.1	
1.800 to 2.600	10^9 to 10^{-3}	0.1		
1.800 to 2.600	10^3 to 10	$0.56 t^{0.25}$		
1.800 to 2.600	10 to 3×10^4		0.1	
2.600 to 10^3	10^9 to 10^{-7}	1×10^{-2}		
2.600 to 10^3	10^{-7} to 10	$0.56 t^{0.25}$		
2.600 to 10^3	10 to 3×10^4		0.1	

[†] See Table 6 and Figures 8 and 9 for correction factors C_A , C_C and time T_1 . For exposure durations greater than 10 seconds and extended sources in the retinal hazard region (0.400 to 1.4 μm), see Table 5b.

Notes:

1. For repeated (pulsed) exposures, see Section 8.2.3.
2. The wavelength region λ_1 to λ_2 means $\lambda_1 \leq \lambda < \lambda_2$, e.g., 0.180 to 0.302 μm means $0.180 \leq \lambda < 0.302 \mu\text{m}$.
3. Dual Limit Application: In the Dual Limit Wavelength Region (0.400 to 0.600 μm), the listed MPE is the lower value of the photochemical and thermal MPEs as determined by T_1 .